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Shade Tree Decline and Related Problems

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SHADE TREE DECLINE AND RELATED PROBLEMS
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Maple and Oak Decline

Shade tree decline is a complex disease situation since the cause frequently cannot be traced to one single factor. Typically, one or more primary stresses cause the health of a tree to deteriorate, and then secondary pathogens and/or insects contribute to further decline. Determining causes of decline requires careful examination of the tree and growing site as well as knowledge of the tree's history. Even then, diagnosis may be difficult because the original stress may be obscure or no longer present. Trees most commonly affected in Kentucky are Norway and sugar maples, ash and oaks (particularly pin oaks).

Symptoms

There are several symptoms that may indicate decline. Early symptoms can include: late spring flush, a decrease in twig and stem growth, and premature fall coloration and leaf drop. As stress continues, foliage may appear small and pale in color. Water sprouts may grow from the branches and trunk. Thinning in the upper crown foliage becomes evident as twigs die back. Larger branches die as the decline progresses. Heavy seed formation may be another indication of decline.
Affected trees may survive indefinitely while continuing to gradually decline, or death may occur in a year or two. Trees that have been declining gradually may appear to suddenly die. This can occur when already weakened trees are subjected to a particularly severe environmental stress (e.g., drought) resulting in an accelerated decline and then "sudden death."

Causes

A wide variety of factors can be involved in shade tree decline:

Poor Soil Conditions

Compacted or poorly drained soils, poor fertility, moisture stress due to competition with turfgrasses, excessive drainage, change in soil level around tree roots.

Unfavorable Weather Conditions

Late spring frost; drought; severe winters; dramatic temperature drop after a warm, wet fall; plant variety not suited to local climate.

People Pressure

Construction, de-icing salts, trunk injury (e.g., mower damage), paving over roots, improper pruning (e.g., topping), improper planting (girdling roots).

Insects and Diseases

Canker fungi, defoliation by leaf spotting fungi, root and butt rot disease, vascular wilt diseases (e.g., Verticillium wilt of maple, ash yellows bacterial scorch of oak), insect borers, defoliation by insects.
In addition, lime-induced iron deficiency is often associated with oak declines and girdling roots can contribute to maple decline. These problems are explained below.

Control

1.Attempt to determine stresses associated with the growing site and alleviate them if possible. Early recognition is important.
2.Water thoroughly during dry periods. Water over several hours using a slow running stream of water from a hose. Move the hose periodically to distribute the water over the entire root area. Mulch soil over

the roots of the tree.
3.Avoid site disturbances, like soil compaction, as well as injuries to the trunk, roots and branches.
4.Apply a fertilizer if needed based on soil test.
5.Prune out dead wood. Do not top tree.
6.See below for methods of correcting iron chlorosis and girdling root problems.

Iron Deficiency
Iron deficiency or chlorosis is a common problem on pin oaks in some locations in Kentucky. The condition, also referred to as lime-induced chlorosis, occurs where soil pH is neutral or alkaline (7.0 or above). Other woody ornamentals particularly sensitive to iron deficiency problems include: American holly, azalea, magnolia, various black and white oaks, and rhododendron.

Symptoms
A pale green or yellowish coloration between leaf veins is the most distinctive symptom of iron deficiency. As the problem becomes more severe over the years, leaves appear smaller than normal with brown dead areas along the margins, resembling leaf scorch. Small, brown angular spots may develop between veins. Shoot growth is stunted and twigs die back. Over a period of years, unless treatment is given, affected trees can die.

Control
1.Soil in pots or in small beds can be acidified by adding sulfur, aluminum sulfate or ammonium sulfate. However, it is difficult to change soil pH under a tree in the landscape.
2.Iron can be added to soil in the form of water-soluble iron chelates commercially available as Sequestrene 138 or 330 Fe. This material can be injected into the soil as a liquid or applied to holes in dry form. A maximum rate of 10 pounds of iron chelate per 1000 square feet of soil can be used. Lower doses should be sufficient in neutral or slightly alkaline soils. Injection sites or holes should be 2 to feet apart and 1 to 6 inches deep. Apply equal portions of liquid or dry material to these sites in the feeder-root zone beneath the canopy drip line. Best results are obtained from treatments made in April, May or June. Treatments usually remain effective for several years.
3.Implantation or injection of iron directly into the trunk of pin oaks is being done with some success. Commercial products such as MEDICAPS and INJECT-A-MIN make use of soluble iron such as ferric (iron) citrate, ferric ammonium citrate or chelated iron. This method, often used by commercial arborists, may be effective for a few months to 1 year. For more detailed information on iron chlorosis, see UK publication ID-84, "Iron Deficiency of Landscape Plants".

Girdling Roots
Tree roots normally grow outward in a radius from the trunk. When a lateral root intertwines with another main lateral root or encircles the trunk, a girdling root problem can occur. The girdling root, in effect, causes "self-strangulation" by restricting the flow of water and nutrients in the tree. This problem is more common on maples (particularly Norway, sugar and silver maples) and pines than on other species.

Symptoms
Affected trees are generally well-established (20 or more years old), often with a past history of having done well in their growing site. Gradually, one or more of the aboveground symptoms of shade tree decline become evident. These symptoms may occur over the entire tree or on one side only. If the problem is not corrected, the tree will eventually die.
To confirm a girdling root problem, carefully examine the base of the trunk. Normally, by the time a tree is 20 years old, lateral roots flare out at the soil surface. A girdling root restricts normal buttress flare so the tree appears to ascend straight up from the ground like a telephone pole. Often the girdling root will be at least partially exposed at the soil surface, forming a noose around the tree. In other cases, careful

digging near the trunk to a depth of 6 to 12 inches may be necessary to locate the problem root.

Causes

A girdling root can be caused by factors originating as far back as transplanting. When roots are cut as the trees are moved from the nursery, secondary roots become dominant and grow across the path of future trunk expansion. If container-grown plant material is root bound at transplanting, the roots may continue to spiral around within the planting hole. Roots of barerooted transplants can become twisted when placed in an improperly dug planting hole. Girdling roots may also be associated with obstacles that prevent normal outward growth of roots. For example, pavement, buildings, boulders, ledges or compacted soil can all impede root growth. As a result, lateral roots may grow back across the main system. In all of these cases, decline symptoms do not develop until the twisted or turned root actually restricts further trunk expansion.

Control

To minimize the likelihood of girdling root problems:

1.Avoid planting in locations where space for proper root development is limited.
2.Make several vertical slits at least one inch deep in the root ball of root-bound container-grown plants before transplanting.
3.Be sure the planting hole is large enough to accommodate the roots of the transplant. It is best to dig the hole larger than the size of the root ball. Contact your county Extension office for information on proper transplanting techniques.
4.Inspect for potential girdling roots several years after transplanting, but before problems develop. Roots near the trunks of girdling-root-prone trees such as maples can be carefully excavated and examined. Lateral roots posing a potential threat can be removed.

Treatment for an already existing girdling root is effective only if the problem is corrected early. If a tree is allowed to decline for a number of years, its chances of recovery are slim.

To remove a girdling root:

1.Sever both ends of the girdling root and allow it to decay in the soil. Remove a couple of inches from the severed ends to prevent the cut ends from rejoining.
2.Fertilize the tree and prune out dead wood the top growth as described under Nos. 4 and 5 of oak and maple decline control.